Analysis of Reject for Black Tea Products Extract on Production Process

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A R T I C L E   I N F O

A B S T R A C T

Quality is a factor that determines the success of a product penetrate the market, in addition to other major factors such as price and service. Quality products will have great competitiveness and high quality level. Products produced from extracts of natural ingredients, one product is Black Tea extract. To maintain customer satisfaction, the company tries to emphasize the value of DPU that occurs. This study aims to analyze the defect reject from the production of Black Tea Extract for a year using SIPOC diagram (Supplier Input Process Output) and Pareto diagram. Result of research is total production during that period equal to 358 batch x 300 Kg = 107400 kg, total reject of 78 batch x 300 kg = 23400 kg, with total reject for Black tea extract 21,79%. Can be known in the process of Black Tea extract reject largest in reject brix out of spec for 93.67% and Reject Tannin out of spec 6.33%. So it can be concluded that the dominant reject of the production process for black tea extract products is reject brix out of spec.

INTRODUCTION

Tea is one of the most popular beverages consumed around the world, second only to water. Polyphenols are the naturally occurring compounds in fresh tea leaves and account for its pungency and unique flavor [1-4]. The four primary polyphenols in fresh tea leaves are epigallocatechin gallate (EGCG), epigallocatechin, epicatechin gallate and epicatechin, with the most abundant being EGCG [5-7].

Quality is a factor that determines the success of a product penetrate the market, in addition to other major factors such as price and service. Quality products will have great competitiveness and high quality level [8-9]. Quality is one of the benchmarks of a company's success. In Indonesia there are companies that produce black tea extract made from black tea leaves. Always keep the quality that consumers want and the consistency of the product. And strive for continuous improvement and development on all parts of the company. One such section is the Production Department [10-11].

The process of making black tea is done in several stages starting from the transfer of raw materials of black tea and ethanol to the extractor machine for the extraction process and the evaporation process in the evaporator machine. Furthermore, centrifugal process in centrifugal machine [12]. And concentration process in concentrator machine then mixing and filling in machine. of all the above processes, the concentrator machine is often an error that can lead to the process of repeated or reject out of specification. And the processing time becomes longer [13].

Therefore it is necessary to do further analysis to determine the factors/potential causes as well as seek alternative improvements to overcome the cause of the reject out of spesification production process in the concentrator machine on the production of black tea extract and preventive measures so that the problem does not arise again [14].

Because these problems will impact serious enough for the company's image in the eyes of consumers with regard to the quality of products produced [15]. Here is the data reject problem in the extract production section in April 2016 until March 2017.

Table 1. Production during the period April 2016 - March 2017

Product	Total Number of Production Results (kg)	Total number of Reject (kg)	Reject of Product (%)
Black Tea Extract	10,7400	23,400	21.79
Green Tea Extract	50,400	7,200	14.29
Green Tea Powder	33,600	3,200	9.52
Black Tea Powder	1,800	1,60	8.89

Based on the data table above can be seen if the number of products reject out of specification is the highest product black tea extract during the period April 2016 - March 2017. This study focused on reject dominant analysis on Black tea Extract products. The final product of black tea extract is very viscous liquid (viscous liquid) and dark brown to black. The product character specifications determined by the company are the amount of dissolved solids or the water content contained in the tea (Brix) and the tannin content often reject out of specification in the concentrator machine.

EXPERIMENTAL METHOD

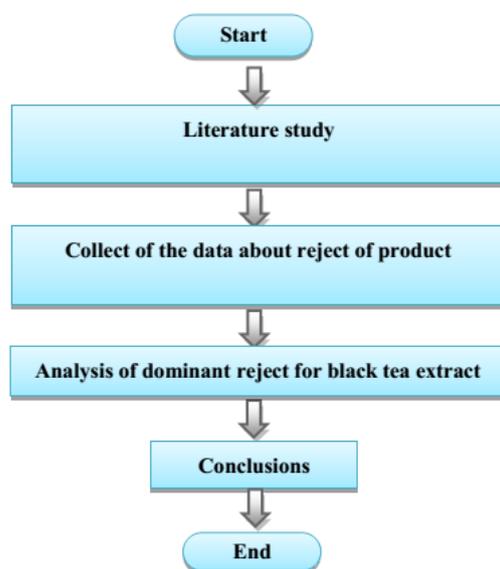The research flowchart is done as in Figure 1 below:

Fig. 1. Flowchart of this research

Based on the Figure 1 the research flow shows the path through which are:
    a. Literature studies were conducted in relation to the research topic
    b. Collect of data about reject from black tea extract production for a year
    c. Analyze data after processed using tools such as SIPOC diagram and Pareto diagram
    d. Taking conclusions from the research that has been done.

RESULTS AND DISCUSSION

The define stage is the earliest stage of improvement and quality improvement. At this stage the definition of what problems will be priority in handling. After the priority of the reject has been determined, then is the manufacture with SIPOC (Supplier Input Process Output). The purpose of knowing the existing workflow, from the beginning of the process to the end of the steps in the define stage is as follows:

Reject Priority Determination
To specify the priority reject, the step to do is to know the number of rejects based on the data that has been collected. The following is the reject data on the processes occurring in the production batches during April 2016 - March 2017, can be seen in Table 2 and 3.

Table 2. Recapitulation the proportion of reject production for 12 months

Month	Number of production (Batch)	number of reject production (Batch)	proportion reject
Apr-16	30	6	0.20
May-16	31	6	0.19
Jun-16	30	6	0.20
Jul-16	25	5	0.20
Aug-16	31	7	0.23
Sep-16	30	6	0.20
Oct-16	31	7	0.23
Nov-16	30	8	0.27
Dec-16	30	7	0.23
Jan-17	30	9	0.30
Feb-17	29	5	0.17
Mar-17	31	6	0.19

Table 2 above shows the value of proportion reject is more valued range 0.17 to 0.30. The largest data batch occurred in January 2017 with the number of production of 30 and reject production that occurred as much as 9. And the smallest proportion reject value occurred in February 2017 of 0.17, with number of production is 29 and reject is 5.

Table 3. Reject category data for April 2016 - March 2017 period

Month	Parameter	number of reject products (Batch)	number of rejects (kg)	Total (kg)	Percentage
Apr-16	Brix	5	1500	1800	8%
	Tanin	1	300		
May-16	Brix	6	1800	1800	8%
	Tanin	0	0		
Jun-16	Brix	6	1800	1800	8%
	Tanin	0	0		
Jul-16	Brix	5	1500	1500	6%
	Tanin	0	0		
Aug-16	Brix	7	2100	2100	9%
	Tanin	0	0		
Sep-16	Brix	6	1800	1800	8%
	Tanin	0	0		
Oct-16	Brix	7	2100	2100	9%
	Tanin	0	0		
Nov-16	Brix	7	2100	2400	10%
	Tanin	1	300		
Dec-16	Brix	6	1800	2100	9%
	Tanin	1	300		
Jan-17	Brix	8	2400	2700	12%
	Tanin	1	300		
Feb-17	Brix	5	1500	1500	6%
	Tanin	0	0		
Mar-17	Brix	6	1800	1800	8%
	Tanin	0	0		

Data Table 3 is a data reject in the concentration process in the concentrator machine in April 2016 - March 2017. From the data it can be seen that the largest reject is the reject Brix out of spec (the amount of dissolved solid/moisture content). A total of 74 batches or as much as 74 x 300 = 22200 kg. Reject Tannin 5 batch or 5 x 300 = 1500 kg. So that reject brix out of spec becomes the biggest reject can interrupt the production process, then reject brix out of spec is a priority that must be handled.

Diagram of SIPOC (Supplier Input Process Output Customer)

SIPOC diagram is one of the techniques used to know the process from the beginning to the end of the production process is done. The SIPOC diagram for the production process of production department of black tea extract can be seen in Fig. 2.
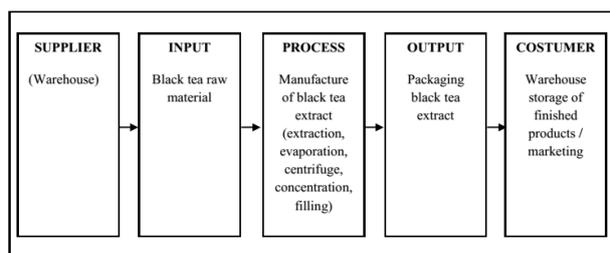

Fig. 2. Diagram of SIPOC for Extra Black Tea Production

Determination of Critical to Quality (CTQ)
Critical to Quality aims to determine the quality characteristics that affect an outcome. Determination of CTQ based on interviews to the QCD (Quality Control Office) and to the operators who work directly to check. The type of defect that exists is reject brix out of specification and reject tannin out of specification, can be seen in Figure 3.
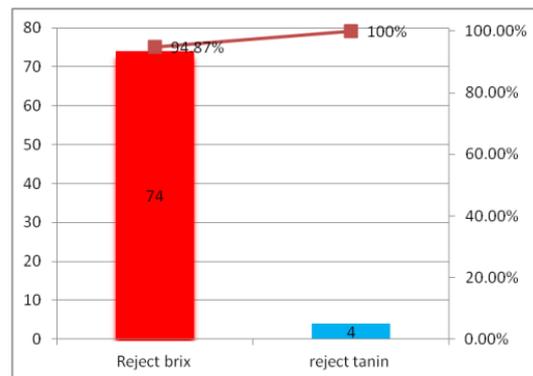

Fig. 3. Pareto Diagram Reject brix out of spec which is a top priority

Based on Figure 3 Pareto diagram showing the production process of black tea this extract occurs reject based on categories - categories that have been determined. Based on the results of pareto, the largest reject is reject brix out of spec 94.87% and reject tannin out of spec is 5.13%. So based on the above pareto then reject brix out of spec which becomes the main priority in the improvement.

CONCLUSION

Based on the results of research to analyze the dominant reject that occurs in the production process in black tea extract products is based on the dominant reject data using SIPOC diagrams and Pareto diagrams that have been made can be seen that for the period April 2016 - March 2017 the largest reject percentage of reject brix out of spec 94.87% and reject tannin out of spec is 5.13%. Then it can be concluded that the dominant reject is brix out of spec.

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